REMARKS

Claim 17 has been added. Claims 1-17 are pending and under consideration. No new matter is being added.

Claim Rejections Under 35 U.S.C. § 103

Claims 1-7

Claims 1-7 were rejected under 35 U.S.C. 103(a) as being unpatentable over Aratani et al. (6,014,121) in view of Mikoshiba et al. (5,907,316) and Matsushiro (6,459,817 B1). This rejection is respectfully traversed for the reasons stated below.

The Examiner alleges at page 2 of the Office action that Aratani et al. teaches a data conversion method for displaying an image (Col. 9, Lines 22-26), comprising conversion of original frame data indicating gradation of a pixel into display frame data (Col. 9, Lines 27-54, figure 7, Col. 9, Lines 62-66) defining a light emission timing of a display element in a display frame period (Col. 13, Lines 56-63). Although the Examiner admits that Aratani et al. "fails to teach the conversion, comprising: determining a light emission waveform in accordance with display frame data of plural frames containing a current frame and a previous frame, of an error between the determined light emission waveform and a target light emission waveform defined by the original frame data corresponding to the determined light emission waveform; and setting the display frame data of the current frame," and that Aratani et al. "fails to teach performing Fourier expansion of the pixel gradation with respect to weights that are obtained by weighing each Fourier component, so that summing the result (error components) helps the changing of the overall darkness of the image is minimized," the Examiner alleges the following.

The Examiner alleges that Matsushiro teaches "performing Fourier expansion of the pixel gradation with respect to weights that are obtained by weighing each Fourier component, so that summing the result (error components) helps the changing of the overall darkness of the image is minimized (Col. 3, Lines 57-67, Col. 4, Lines 31-41)..." and "[t]hus it is obvious to one in the ordinary skill in the art at the time of the invention was made to incorporate teaching of Matsushiro in Arantani et al. teaching for reducing unstable and flickering in high contrast image display medium."

It is respectfully submitted that in Matsushiro, Fourier expansion is not performed in

pseudo-tone pattern reproduction due to error diffusion, which is what Matsushiro is addressing. More specifically, as disclosed in column 3, lines 57-67, for example, setting of quadrants in a pattern matrix is "similar to" the equal positive and negative intervals of the sine functions used in Fourier-series expansion." Hence, Matsushiro uses the terminology of "Fourier-series expansions" and Fourier integration" merely to describe a technique identified as being similar to Fourier expansion. However, Matsushiro fails to disclose actual Fourier expansion on any values. Accordingly, it is respectfully submitted that contrary to the assertions by the Examiner, Matsushiro does not teach or suggest, among other things, "performing Fourier expansion of an error between the determined light emission waveform and a target light emission waveform defined by the original frame data corresponding to the determined light emission waveform," as recited in independent claim 1 of the present invention.

In addition to the above comments, it is respectfully submitted that although Matsushiro illustrates that a threshold applied to quantization of input data is modified periodically base on movement of a noted pixel position, and that plural periodic functions are weighted and added in order to generate a function defining the modification, Matsushiro does not teach that plural values depending on output image data are weighted and added, and that the output data are set so that a sum obtained by the weighting and the addition is minimized. In column 7, line 45 of Matsushiro, the formula shows a sum of periodic functions obtained by weighting and addition, which is taught by Matsushiro, depends on input image data, but does not depend on output image data. This inevitably leads to the conclusion that the sum of periodic functions (in Matsushiro) does not depend on an error between the input image data and the output image data. Next, the sum of periodic functions is applied to a calculation of a modified threshold Th'(x,y) (see col. 7, lines 47-50). In other words, in Matsushiro, it is not determined whether the sum of periodic functions is the minimum value or not. Accordingly, it is respectfully submitted that Matsushiro does not teach or suggest "performing Fourier expansion of an error between the determined light emission waveform and a target light emission waveform defined by the original frame data corresponding to the determined light emission waveform," or "setting the display frame data of the current frame so that a sum or error components, with respective weights that are obtained by weighting each Fourier component, is minimized," as recited in independent claim 1, which is also missing from the teachings of both Aratani et al. and Mikoshiba et al., as admitted by the Examiner.

In view of the above comments, it is respectfully submitted that claim 1 is patentable over Aratani et al., Mikoshiba et al. and Matsushiro, separately, or in combination, and withdrawal of this rejection and allowance of claim 1 are earnestly solicited. Further, for at least the reason that claims 2-7 depend from allowable independent claim 1, it is respectfully submitted that claims 2-7 are also allowable.

Claims 8-14

Claims 8-14, were rejected under 35 U.S.C. 103(a) as being unpatentable over Mikoshiba et al. (5,907,316) in view of Matsoshiro (6,459,817 B1). This rejection is respectfully traversed for the reasons stated below.

It is respectfully submitted that for similar reasons as pointed out above, regarding independent claim 1, claim 8 is allowable over both Mikoshiba et al. and Matsoshiro, since independent claim 8 recites similar features as claim 1. For example, neither Mikoshiba et al. nor Matsoshiro teach or suggest actual Fourier expansion or that plural values depending on output image data are weighed and added, and that the output data are so set that a sum obtained by the weighting and the addition is minimized. As stated above, in Matsoshiro, according to the formula at column 7, line 45, a sum of periodic functions obtained by weighting and addition, depends on input image data, but does not depend on output image data. Accordingly, the sum of periodic functions of Matsoshiro does not depend on an error between the input image data and the output image data. Further, the sum of periodic functions is applied to a calculation of modified threshold Th'(x,y) (column 7, lines 47-50), and thus it is not determined in Matsoshiro whether the sum of periodic functions is the minimum value of not. More specifically, it is respectfully submitted that neither Mikoshiba et al. nor Matsoshiro teach or suggest, among other things, "performing Fourier expansion of an error between a gradation indicating a gradation transition defined by display frame data of plural frames containing the current frame and the previous frame and a target gradation waveform defined by original frame data corresponding to the gradation waveform," or "setting the display frame data of the current frame so that a sum or error components, with respective weights that are obtained by weighting each Fourier component, is minimized," as recited in independent claim 8 of the present invention. Accordingly, it is respectfully submitted that independent claim 8 is patentable over both Mikoshiba et al. and Matsoshiro, separately, or in combination thereof, and withdrawal of

this rejection and allowance of claim 8 are earnestly solicited. Further, for at least the reason that claims 9-14 depend from allowable independent claim 8, it is respectfully submitted that these claims are also allowable.

Claims 15 and 16

Claims 15, 16, were rejected under 35 U.S.C. 103(a) as being unpatentable over Mikoshiba et al. (5,907,316) in view of Matsoshiro (6,459,817 B1). This rejection is respectfully traversed for the reasons stated below.

It is respectfully submitted that for at least the reason that independent claim 15 includes all of the limitations of allowable independent claim 1, while independent claim 16 includes all of the limitations of allowable independent claim 8, these claims are also patentable over both Mikoshiba et al. and Matsoshiro, separately, or in combination thereof, and withdrawal of this rejection and allowance of claims 15-16 are earnestly solicited.

New claim 17

It is respectfully submitted that new claim 17 is patentable over the prior art of record for at least the reason that none of the references cited teach or suggest, among other things, "

CONCLUSION

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: April 16, 2003

By: Patrick J. Stanzione
Registration No. 40,434

700 Eleventh Street, NW, Suite 500
Washington, D.C. 20001
(202) 434-1500

VERSION WITH MARKINGS SHOWING CORRECTIONS

Please add the following new claim:

17. (NEW) A data conversion method to display an image, comprising:

determining a light emission waveform in accordance with display frame data of plural frames containing a current frame and a previous frame; and

performing Fourier expansion of an error between the determined light emission waveform and a target light emission waveform defined by the original frame data corresponding to the determined light emission waveform.